ART 34 AMDT

Claims:

1. Isolated human soluble guanylyl cyclase α1 (hsGCα1; SEQ ID NO: 2)/β1 (hsGCβ1; SEQ ID NO: 4) purified to apparent homogeneity.

2. A method for the production of α1 (hsGCα1; SEQ ID NO:2) and β1 (hsGCβ1; SEQ ID NO:4) subunits of human soluble guanylyl cyclase comprising the expression in prokaryotic or eukaryotic host cells of expression vectors containing the DNA sequence of hsGCα1 and hsGCβ1 and obtaining the subunits.

3. The method for producing the α1 and β1 subunits of human soluble guanylyl cyclase according to claim 2, wherein the step of obtaining the subunits comprises a lysis of the cells, the affinity chromatography of the cell lysate, and the subsequent elution of the subunits.

4. The method for producing the α1 and β1 subunits of human soluble guanylyl cyclase according to claim 2 or 3, wherein the expression vector contains at least one additional DNA sequence coding for a domain for the specific affinity chromatography (affinity tag) with appended protease cleavage site.

5. The method for producing α1 and β1 subunits of human soluble guanylyl cyclase according to claim 4, wherein the expression vector contains the DNA sequence for hsGCα1 with affinity tag, the DNA sequence for hsGCβ1 with affinity tag, the DNA sequence for hsGCα1 with affinity tag, and the DNA sequence for hsGCβ1, the DNA sequence for hsGCβ1 with affinity tag and the DNA sequence for hsGCα1, or the DNA sequence hsGCα1 with affinity tag and the DNA sequence for hsGCβ1 with affinity tag.

6. The method for producing human soluble guanylyl cyclase α1 (hsGCα1; SEQ ID NO: 2)/β1 (hsGCβ1; SEQ ID NO: 4) comprising the separate expression in prokaryotic or eukaryotic host cells of an expression vector containing the DNA sequence for hsGCα1 or hsGCβ1, extraction of the subunits, and

reconstitution of subunits hsGCα1 and hsGCβ1 to form the dimeric guanylyl cyclase α1/β1 (hsGCα1/β1).

7. The method for producing human soluble guanylyl cyclase α1/β1 according to claim 6, wherein the step for the purification of the subunits consists of a separate lysis of cells containing hsGCα1 or hsGCβ1, the separate affinity chromatography of the cell lysates, and the subsequent elution of the subunits.

8. The method for producing human soluble guanylyl cyclase α1 (hsGCα1; SEQ ID NO: 2)/β1 (hsGCβ1; SEQ ID NO: 4) consisting of the coexpression of the DNA sequences of hsGCα1 and hsGCβ1 in prokaryotic or eukaryotic host cells, a lysis of the cells containing hsGCα1 and hsGCβ1, and affinity chromatography and subsequent elution of hsGCα1/β1.

9. Use of a nucleotide sequence encoding the hsGCα1(SEQ ID NO: 2) and/or hsGCβ1 (SEQ ID NO:4) subunits of human soluble guanylyl cyclase α1/β1 for somatic gene therapy.

10. Use according to claim 9, wherein vectors or a mixture of vectors contain the nucleotide sequence of human soluble guanylyl cyclase α1 (hsGCα1) and/or human soluble guanylyl cyclase β1 (hsGCβ1).

11. Use according to claim 9 or 10 for the prevention and therapy of atherosclerosis and its complications, of restenosis, ischemia (infarction), peripheral arterial occlusive diseases, and arterial hypertension as well as for the prevention of atherosclerosis in patients with risk factors, transient ischemic attacks, cerebral ischemia, stroke (Apoplex), coronary heart disease, status post coronary bypass grafting, carotid stenosis, heart insufficiency and liver dysfunction, and as a supplement to therapy with sGC activators, sGC-sensitizing substances, NO donors, or phosphodiesterase inhibitors.

12. Use according to claims 9 to 11, wherein the somatic gene transfer is carried out with endothelial cells, vascular smooth muscle cells, neointimal cells,

fibroblasts, or other vascular cells or blood particles (platelets, leukocytes, and others), or liver.

13. Antibodies against human soluble guanylyl cyclase α1 (hsGCα1; SEQ ID NO: 2)/β1 (hsGCβ1; SEQ ID NO: 4) obtainable by immunization of a mammal with the peptide fragment Phe-Thr-Pro-Arg-Ser-Arg-Glu-Glu-Leu-Pro-Pro-Asn-Phe-Pro, or parts thereof, or immunogenic peptide fragments that overlap with this fragment, or obtainable by immunization of a mammal with the peptide fragment Lys-Gly-Lys-Lys-Glu-Pro-Met-Gln-Val-Trp-Phe-Leu-Ser-Arg-Lys-Asn-Thr-Gly-Thr-Glu-Glu-Thr or immunogenic fragment or immunogenic peptide fragments that overlap with this fragment and isolation of the antibodies.